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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/618,857	07/15/2003	Taekyun Kim	033808-004	6991

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EXAMINER
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YUAN, KATHLEEN S

ART UNIT	PAPER NUMBER
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2624

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/12/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/618,857	<b>Applicant(s)</b> KIM ET AL.	
	<b>Examiner</b> Kathleen S. Yuan	<b>Art Unit</b> 2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 06 May 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-38 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8, 10-17, 19-27 and 29-37 is/are rejected.
- 7) ☒ Claim(s) 9, 18, 28 and 38 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                  | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

2. Claims 1 and 19 are rejected under 35 U.S.C. 102(a) as being unpatentable by "An extension of the component-based LDA descriptor by the Generalized Discriminant Analysis" (Franc et al)

3. Regarding claim 1, Franc et al discloses an apparatus for retrieving face images using combined component descriptors (fig. 1), comprising: an image division unit for dividing an input image into facial components, wherein the face is  $x_i$  and the divided facial components are the specific areas of the face (pg. 3, lines 20-21); a Linear Discriminant Analysis (LDA) transformation unit for LDA transforming the divided facial components into component descriptors,  $y_i^1$ ,  $y_i^2$ , etc, of the facial components, that which carries out step 1 on page 3; a vector synthesis unit for synthesizing the transformed component descriptors into a single vector,  $y_i$ , that which carries out step 2 on page 3; a Generalized Discriminant Analysis (GDA) transformation unit for GDA transforming the single vector into a single face descriptor,  $z_i$ , and that which carries out step 3, and a similarity determination unit for determining similarities between an input query face image and face images stored in a face image database (DB) by comparing a face descriptor of the input query face image with face descriptors of the face images stored in the face image DB, that which carries out the process in the introduction

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wherein similar images, or images in a database, are found to a given input query image.

4. Claim 19 is rejected for the same reasons as claim 1. Thus, the arguments analogous to that presented above for claim 1 are equally applicable to claim 19. Claim 19 distinguishes from claim 1 only in that claim 19 is a method claim and claim 1 is an apparatus claim. An apparatus carries out a method; therefore, prior art applies.

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 10 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Franc et al in view of "Generalized Discriminant Analysis Using a Kernel Approach" (Baudat).

Claim 10 is rejected for the same reasons as claim 1. Thus, the arguments analogous to that presented above for claim 1 are equally applicable to claim 10. Claim 10 distinguishes from claim 1 only in that Claim 10 uses a second LDA unit instead of a GDA unit.

Franc et al does not disclose expressly using a second LDA unit instead of a GDA unit.

Baudat discloses how to generalize LDA to nonlinear problems and develop a GDA, "by mapping the input space into a high dimensional feature space with linear properties. In the new space one can solve the problem in a classical way, such as with the LDA method" (pg. 1). In other words, by the GDA unit is carrying out the LDA method; therefore, the second unit can also be called an LDA unit.

Franc et al and Baudat are combinable because they are from the same field of endeavor, i.e. GDA and LDA.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use LDA in the GDA unit.

The suggestion/motivation for doing so would have been to provide a straightforward way to finish the discriminant analysis once the new space is converted.

Therefore, it would have been obvious to combine Franc et al with Baudat to obtain the invention as specified in claim 10.

7. Claim 29 is rejected for the same reasons as claim 10. Thus, the arguments analogous to that presented above for claim 10 are equally applicable to claim 29. Claim 29 distinguishes from claim 10 only in that claim 29 is a method claim and claim 10 is an apparatus claim. An apparatus carries out a method; therefore, prior art applies.

8. Claims 5-8 and 23-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Franc et al in view of "Multiresolution Eigenface Components" (Kouzani et al).

Regarding claim 6, Franc et al discloses all of the claimed elements as set forth above and incorporated herein by reference.

Franc et al does not disclose expressly that the divided facial components partially overlap each other.

Kouzani et al discloses the facial components partially overlapping each other, i.e. the eyes and the nose as shown in fig. 2.

Franc et al and Kouzani et al are combinable because they are from the same field of endeavor, i.e. facial image processing.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to have the components partially overlap each other.

The suggestion/motivation for doing so would have been to provide a more accurate recognition by not limiting the field of each of the facial components and supplying the most information for that facial component.

Therefore, it would have been obvious to combine Franc et al with Kouzani et al to obtain the invention as specified in claim 6.

9. Regarding claim 5, Kouzani et al discloses that the image DB stores face descriptors of the face images (fig. 3); and the comparing of the input query face image with the face images of the image DB is performed by comparing the face descriptor of the input query face image with the face descriptors of the face images stored, or training sets, in the image DB (pg. 3, section 4.2).

10. Regarding claim 7, Kouzani et al discloses the face is divided into eyes, nose and mouth (see fig. 3).

11. Regarding claim 8, Kouzani et al discloses the similarity determination unit extracts first similar face images similar to the input query face image, one training set of the known individuals and second similar face images, a second training set of the known individuals, similar to the first face images from the image DB; they are similar because they are split in a similar fashion. Kouzani et al further discloses determining similarities between the input query face image and the face images of the image DB using the similarities between the input query face image and the second similar face images since the input query image is compared to both the second images and first images in order to classify the query image (pg. 3, section 4.2).

Also, Kouzani et al discloses extracting first similar face images, the split up data of the input face, similar to the input query face image because it shares information from the face (fig. 2) and second similar face images, the split of data in the database, similar to the first face images because they are split up in the same way, from the image DB (fig. 3); and determining similarities between the input query face image and the face images of the image DB using the similarities between the input query face image and the second similar face images (page 3, section 4.2), since the query face/first images are compared to the training sets/database images/ second image set.

12. Claims 23-26 are rejected for the same reasons as claims 5-8 respectively. Thus, the arguments analogous to that presented above for claims 5-8 are equally applicable to claims 23-26. Claims 23-26 distinguish from claims 5-8 only in that they

have different dependencies, both of which have been previously rejected. Therefore, prior art applies.

13. Regarding claim 27, Kouzani discloses a step of extracting the first and second similar face images comprises: the first similarity determination step of determining similarities between the input query face image and the face images of the image DB (page 3, section 4.2), wherein the similarities are found between the query face and the training sets/ database; the first similar face image extraction step of extracting the first similar face images, wherein the first similar face images are the pieces of image data as seen in fig. 2, in an order of similarities, being in the order of being similar to a part of the face (fig. 2, L0, L1...etc) according to results of the first similarity determination step because the order is needed for the comparison of the first step; the second similarity determination step of determining similarities between the first similar face images and the face images of the image DB (page3, paragraph 4.2); and the second similar face image extraction step of extracting the second similar face images for each of the first similar face images, since the different parts of the face are compared accordingly, in an order of similarities according to results of the second similarity determination step, in the same order of eyes, nose and mouth (fig. 3).

14. Claims 14-17 and 33-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Franc et al in view of Baudat, as applied to claims 10 and 29 above, and further in view of Kouzani.



Claims 14-17 and 33-37 are rejected for the same reasons as claims 5-8 and 23-27 respectively. Thus, the arguments analogous to that presented above for claims 5-8 and 23-27 are equally applicable to claims 14-17 and 33-37. Claims 14-17 and 33-37 distinguishes from claims 5-8 and 23-27 only in that they have different dependencies, all of which have been previously rejected on similar art. Therefore, prior art applies.

15. Claims 2, 3 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Franc et al in view of U.S. Patent Application Publication No. 20030212552 (Liang et al).

Regarding claim 2, Franc et al discloses all of the claimed elements as set forth above and incorporated herein by reference. Franc et al further discloses LDA transformation units for LDA transforming the divided facial components into component descriptors of the facial components (fig. 1, LDA boxes)

Franc et al does not disclose expressly vector normalization units for vector normalizing the transformed component descriptors into a one-dimensional vector.

Liang et al discloses that linear discriminant analysis transforms a space into a one-dimensional space; thus, LDA performs normalization to get a one-dimensional vector (pg 2, pg 0015).

Franc et al and Liang et al are combinable because they are from the same field of endeavor, i.e. LDA for facial image processing.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to get a one-dimensional result from LDA.

The suggestion/motivation for doing so would have been to speed later processing by providing only one-dimensional value.

Therefore, it would have been obvious to combine Franc et al with Liang et al to obtain the invention as specified in claim 2.

16. Regarding claim 3, Franc et al discloses the there are separate LDA transformation units, and thus, vector normalization units for the divided facial components (fig 1).

17. Claim 20 is rejected for the same reasons as claim 2. Thus, the arguments analogous to that presented above for claim 2 are equally applicable to claim 20. Claim 20 distinguishes from claim 2 only they have different dependencies, both of which have been previously rejected.

18. Claims 11, 12 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Franc et al in view of Baudat, as applied to claims 10 and 29 above, and further in view of Liang et al.

Claims 11, 12 and 30 are rejected for the same reasons as claims 2, 3 and 20 respectively. Thus, the arguments analogous to that presented above for claims 2, 3 and 20 are equally applicable to claims 11, 12 and 30. Claims 11, 12 and 30 distinguishes from claims 2, 3 and 20 only in that they have different dependencies, all of which have been previously rejected on similar art. Therefore, prior art applies.

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19. Claims 4 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Franc et al in view of U.S. Patent No. 5199081 (Salto et al).

Regarding claim 4, Franc et al discloses all of the claimed elements as set forth above and incorporated herein by reference. Franc et al further discloses transformation coefficients/ matrices (pg. 3, line 14-17) used in GDA.

Franc et al does not disclose expressly a transformation matrix/transformation coefficient DB for storing the transformation matrix or transformation coefficients calculated by training the face images stored in the image DB.

Salto et al discloses a coefficient ROM storing coefficient data, or in other words, a coefficient DB (col. 10, lines 61-65).

Franc et al and Salto are combinable because they are from the same field of endeavor, i.e. facial recognition.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to store coefficients.

The suggestion/motivation for doing so would have been to remember the procedure history and coefficients of the system, thus providing a more user-friendly system if the operator wishes to follow along/ debug.

Therefore, it would have been obvious to combine Franc et al with Salto et al to obtain the invention as specified in claim 4.

20. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Franc et al in view of Baudat, as applied to claims 10 and 29 above, and further in view of Salto et al.

Claim 13 is rejected for the same reasons as claim 4. Thus, the arguments analogous to that presented above for claim 4 are equally applicable to claim 13. Claim 13 distinguishes from claim 4 only in that they have different dependencies, all of which have been previously rejected on similar art. Therefore, prior art applies.

21. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Franc et al in view of U.S. Patent No. 6526396 (Hiratsuka et al).

Franc et al discloses all of the claimed elements as set forth above and incorporated herein by reference

Franc et al does not disclose expressly outputting the face images of the image DB retrieved based on the determined similarities.

It is obvious if not inherent to output a recognition result, and Hiratsuka et al discloses outputting a determination result (col. 17, line 27-30).

Franc et al are combinable because they are from the same field of endeavor, i.e. personal identification.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to output the images that are similar.

The suggestion/motivation for doing so would have been to increase the speed of the recognition process by giving a result to an operator and help create a more accurate recognition by determining the accuracy of the match.

Therefore, it would have been obvious to combine Franc et al with Hiratsuka et al to obtain the invention as specified in claim 22.

22. Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Franc et al in view of Baudat as applied to claim 29 above, and further in view of Hiratsuka et al.

Claim 32 is rejected for the same reasons as claims 22. Thus, the arguments analogous to that presented above for claim 22 are equally applicable to claim 32. Claim 32 distinguishes from claim 22 only in that they have different dependencies, both of which have been previously rejected on similar art. Therefore, prior art applies.

23. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Franc in view of U.S. Patent Application Publication No 20030055615 (Zhang et al).

Franc et al discloses all of the claimed elements as set forth above and incorporated herein by reference

Franc et al does not disclose expressly LDA transforming is carried out using a transformation matrix or a transformation coefficient calculated by training the face images stored in the image DB.

Zhang et al discloses training data is used to find a covariance matrix, which is used to determine the classification model, which is a transformation (pg. 2 paragraph 16).

Franc et al and Zhang are combinable because they are from the same field of endeavor, i.e. LDA.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use the training data to perform LDA

The suggestion/motivation for doing so would have been to provide a more accurate comparison between the database by taking it into account early.

Therefore, it would have been obvious to combine Franc with Zhang et al to obtain the invention as specified in claim 21.

24. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Franc et al in view of Baudat, as applied to claim 29 above, and further in view of Zhang.

Claim 31 is rejected for the same reasons as claim 21. Thus, the arguments analogous to that presented above for claim 21 are equally applicable to claim 31. Claim 31 distinguishes from claim 21 only in that they have different dependencies, all of which have been previously rejected on similar art. Therefore, prior art applies.

***Allowable Subject Matter***

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25. Claims 9, 18, 28 and 38 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

26. Claims 9, 18, 28 and 38 are allowable because they contain a specific equation that is not disclosed in prior art in finding the input query image's match using first and second similar face images.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kathleen S. Yuan whose telephone number is (571)272-2902. The examiner can normally be reached on Monday to Thursdays, 9 AM to 5 PM.

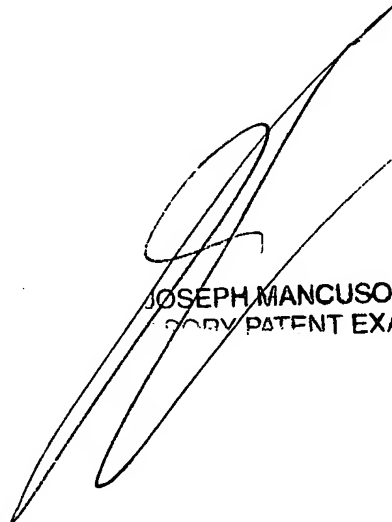
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph Mancuso can be reached on (571)272-7695. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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KY

1/6/2007



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